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⑭ 考案の名称 防水カメラ

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## 明 細 書

### 1. 考案の名称

防水カメラ

### 2. 実用新案登録請求の範囲

遮光筒の前端に拡張用段部を介して鏡胴案内用筒状体を同芯に突設したカメラボディーの前記鏡胴案内用筒状体の前端面に固定した蛇の目状の前遮光板には後端面に複数個のばね受け爪を備えた前遮光リングを進退可能に嵌合せしめる一方、前記前遮光リングの後端面に係合せしめられる係止用鍔と前記ばね受け爪を遊嵌せしめる切込み溝とを後端部に設けた外側リングと鏡胴を保持せしめた内側リングとを中央部に導光口を有する円板の後面に間隔をあけて一体に形成せしめた鏡胴保持リングを、前記外側リングと内側リングとの間に前記ばね受け爪にて受け止められたばねを介装せしめて、前記前遮光リング内に進退可能に嵌合せしめ、また前記鏡胴の後端部には前記鏡胴案内用筒状体内に進退可能に嵌合せしめた蛇の目状の後遮光板と前記遮光筒内に進退可能に嵌合せしめた

後遮光リングとを一体に形成せしめた焦点切換え用遮光部材を固定してなるカメラ本体部を、前面部には透光用窓ガラスが水密に装着せられた鏡胴案内用筒状体保護用筒体部が形成せられた前カバーの後面部には後蓋が水密に閉鎖可能に螺着された外郭体内に収納せしめてなることを特徴とする防水カメラ。

### 3. 考案の詳細な説明

#### (産業上の利用分野)

本考案は、防水カメラに関するものである。

#### (従来技術)

従来、前面部には透光用窓ガラスが水密に装着せられた鏡胴案内用筒状体保護用筒体部が形成せられた前カバーの後面部に後蓋が水密に閉鎖可能に螺着された外郭体内に、カメラ本体部を収納せしめてなる防水カメラがある。

#### (考案が解決しようとする問題点)

ところで、この種従来よりの防水カメラにあっては、焦点距離切換えの倍率を大きくするために、撮影レンズの移動範囲を大きくする必要があり、

撮影レンズの移動範囲を大きくすればする程、遮光すべき遮光範囲が広くなるとともに、撮影レンズを繰出したときの突出の度合いが大きくなり、繰出された撮影レンズを覆う外郭体の前面部はより一層突出した形状になることが避けられない。この突出の度合いが大きくなることは、防水カメラの大型化を招くという問題点がある。

本考案は、前述の実状に鑑みてなされたものであって、焦点距離切換えの倍率を大きくするも、大型化するのを抑制できる防水カメラの提供を目的とするものである。

(問題点を解決するための手段)

本考案は、前記の目的を解決するために、遮光筒の前端に拡張用段部を介して鏡胴案内用筒状体を同芯に突設したカメラボディーの前記鏡胴案内用筒状体の前端面に固定した蛇の目状の前遮光板には後端面に複数個のばね受け爪を備えた前遮光リングを進退可能に嵌合せしめる一方、前記前遮光リングの後端面に係合せしめられる係止用鉤と前記ばね受け爪を遊嵌せしめる切込み溝とを後端

部に設けた外側リングと鏡胴を保持せしめた内側リングとを中央部に導光口を有する円板の後面に間隔をあけて一体に形成せしめた鏡胴保持リングを、前記外側リングと内側リングとの間に前記ばね受け爪にて受け止められたばねを介装せしめて、前記前遮光リング内に進退可能に嵌合せしめ、また前記鏡胴の後端部には前記鏡胴案内用筒状体内に進退可能に嵌合せしめた蛇の目状の後遮光板と前記遮光筒内に進退可能に嵌合せしめた後遮光リングとを一体に形成せしめた焦点切換え用遮光部材を固定してなるカメラ本体部を、前面部には透光用窓ガラスが水密に装着せられた鏡胴案内用筒状体保護用筒体部が形成せられた前カバーの後面部には後蓋が水密に閉鎖可能に螺着された外郭体内に収納せしめてなることを特徴とする防水カメラである。

(作用)

本考案に係る防水カメラは上述の如き構成なるをもって、その前遮光リングと鏡胴保持リングと鏡胴とが後退せしめられた通常の撮影状態から望

遠撮影状態への切換えにあたっては、当初鏡胴保持リングと鏡胴は一体に前進せしめられるが、このとき、鏡胴保持リングを構成する外側リングと内側リングとの間に介装せしめたばねは伸張し、このばねの付勢によって、前遮光リングは鏡胴保持リング、鏡胴とともに前進するのを阻止されるも、鏡胴保持リングの係止用鍔が前遮光リングの後端面に係合せしめられると、前遮光リングは鏡胴保持リング、鏡胴とともに前進せしめられ、望遠撮影状態となる。

以上のように、鏡胴が前進せしめられた望遠撮影状態のときの前遮光リングは、鏡胴が後退せしめられた通常撮影状態のときに比べて、鏡胴保持リングに対して、通常撮影状態のときにおける前遮光リングの後端面と鏡胴保持リングの係止用鍔との間の間隔だけ後退した状態となるから、この間隔の分だけ外郭体の透光用窓ガラスを装着した前端開口縁部を後退せしめることが可能となる。

また、鏡胴が前進せしめられる際には、鏡胴に固定した焦点切換え用遮光部材を構成する後遮光

リングが遮光筒から引出されることによって、遮光すべき範囲が拡大された状態における遮光が可能となる。

さらに、鏡胴が進退せしめられる際には、鏡胴に固定した焦点切換え用遮光部材を構成する後遮光板が鏡胴案内用筒状体内に嵌合した状態で進退するので、鏡胴は鏡胴案内用筒状体にて円滑に案内される。

#### (実施例)

以下、本考案に係る防水カメラの実施例を図示した図面によって、本考案の実施例を詳細に説明することとする。

図において、Xは防水カメラにして、この防水カメラXはカメラ本体部Yとこのカメラ本体部Yを水密状態に収納保持する外郭体Zとを主構成要部としてなっている。

そして、上記カメラ本体部Yはカメラボディー10、前遮光板20、前遮光リング30、鏡胴保持リング40、撮影レンズ100が装着せられる鏡胴50、焦点切換え用遮光部材60、シャ



ッター部材 70、補助レンズ 101、その他図示と説明を省略した焦点切換え用機構、シャッター操作作動用機構、補助レンズ進出、退去操作機構、駆動用モーター等で構成され、また上記外郭体 Z は前カバー 80 と裏蓋 90 とで構成されている。

ところで、上記カメラボディ 1.0 は、これまでのものと略同等のもので、前面側には光路形成用部を囲んで拡径用段部 1.1 を介して鏡胴案内用筒状体 1.2 を、後面側には前記鏡胴案内用筒状体 1.2 と同芯で、これより小径の遮光筒 1.3 を、該遮光筒 1.3 の一側方には後方に開口せしめられたスプール室 1.4 を、また他側方には後方に開口せしめられたバトロネ室 1.5 を、さらに該バトロネ室 1.5 の外側方には電池室 1.6 を備えてなるものであり、前記スプール室 1.4 内には図外の駆動機構によって回転せしめられるようにスプール 1.7 が装着せられている。

また、上記前遮光板 2.0 は、中央部に透孔 2.1 が施された蛇の目状の円板に反射防止加工を施してなるものであって、この前遮光板 2.0 は前記カ

メラボディー10の鏡胴案内用筒状体12の前端面に同芯となるように固定されており、上記前遮光リング30は、特に第3図と第4図に示したように、前記前遮光板20の透孔21内に進退可能に嵌合せしめられたリング主体の前端部には前遮光板20の前面に係合する鏑31を、後端面32には後述する鏡胴保持リング40を構成する外側リング42と内側リング43との間に介装せしめられたばね33の後端部を係止する数個のばね受け爪34、・・・が略等間隔で内側方向に突設せしめられてなるものである。

また、上記鏡胴保持リング40は、前記前遮光リング30の前端開口部35に嵌合せしめられるとともに中央部に漏斗状の導光口44を有する円板41の後面の外側縁部には、該円板41と同径の外径を有する外側リング42を、外円板41の後面の導光口44寄りには、前記前遮光リング30のばね受け爪34、・・・の内端面に嵌合する内側リング43をそれぞれ弾性材料にて一体に形成し、該外側リング42の後端縁部には外側に向

けて係止用鉤 4 5 を突設するとともに、該外側リング 4 2 の後端部には前記前遮光リング 3 0 のばね受け爪 3 4 . . . を遊嵌せしめる切込み溝 4 6 . . . を設けてなるものであり、前記内側リング 4 3 内に上記鏡胴 5 0 が保持せしめてある。

また、上記焦点切換え用遮光部材 6 0 は、前記カメラボディー 1 0 の鏡胴案内用筒状体 1 2 内に進退可能に嵌合せしめられた蛇の目状の後遮光板 6 1 の前面には、上記鏡胴 5 0 の後端面に固定せしめられた環状突条 6 2 を、後面には前記カメラボディー 1 0 の遮光筒 1 3 内に進退可能に嵌合せしめられた後遮光リング 6 3 を一体に形成してなるものであり、前記後遮光板 6 1 に上記シャッター部材 7 0 が配装せしめてある。

前記撮影レンズ 1 0 0 が装着せられてなる鏡胴 5 0 と鏡胴保持リング 4 0 と焦点切換え用遮光部材 6 0 とは一体となって進退し、<sup>（その）</sup>進退の範囲は後遮光板 6 1 と前遮光板 2 0 と拡張用段部 1 1 とによって規制されるようになしてある。

1 0 1 は望遠撮影の際に撮影レンズ 1 0 0 と協

同する補助レンズであって、この補助レンズ101は、図外の焦点切換え用機構に連動する図外の補助レンズ進出、退去操作機構によって、通常撮影の際には撮影レンズ100の光路外に退去せしめられ、望遠撮影の際には補助レンズ101が撮影レンズ100の後方に進出せしめられ、撮影レンズ100の光軸と補助レンズ101の光軸とが一致せしめられるようになしてある。

さらに、上記前カバー80は、カメラ本体部Yの前面を覆う前面部には、前記遮光筒13と鏡胴案内用筒状体12との共通中心軸線と一致する中心軸線を有する截頭円錐筒状の鏡胴案内用筒状体保護用筒体部81を形成せしめるとともに、その前端開口縁部82に透光用窓ガラス83をリング84と該前端開口縁部82の奥部にビスねじ85にて固定した漏斗状導光口86を有する環状押え部材86とによって水密に装着する一方、前記カメラ本体部Yの側面を覆う部分の後端開口縁部87に凹設した防水用溝88内に防水用弾性体89を挿着してなるものである。

また、上記裏蓋 90 は、蓋板の内面には前記カメラ本体部 10 のスプール室 14 の外側壁部の内面 18 に係合せしめられる突起 91 と前記パトリネ室 15 の外側壁部の内面 19 に係合せしめられる突起 92 を突設し、前記前カバー 80 の後端開口縁部 87 と合致するように形成した周縁部 93 には前カバー 80 の防水用弾性体 89 と協同する防水用突条 94 を突設するとともに、突起 91、92 間には前記遮光筒 13 の後端開口縁部 13' にフィルムを圧接せしめる圧板 95 を取付けてなるものであり、前記裏蓋 90 を前カバー 80 に図外の蝶番にて開閉可能に螺着することによって外郭体 Z が構成され、裏蓋 90 を閉じると、外郭体 Z の内部は水密に保持されるようになっている。

前記カメラ本体部 Y を外郭体 Z 内に収納せしめるには、前遮光板 20 の外周縁部を鏡胴案内用筒状体保護用筒体部 81 の内面に固定するとともに前遮光板 20 の前面に環状押え部材 86 の漏斗状の導光口 86' を固定し、カメラ本体部 10 の

側面を前カバー80に嵌合せしめることによって、カメラ本体部Yを前カバー80に固定せしめ、次いで、裏蓋90を閉じ、水密となすのである。

本考案にかかる防水カメラは上述のように構成されているので、裏蓋90を開き、フィルムを装填し、裏蓋90を閉鎖すると、裏蓋90の周縁部93に突設した防水用突条94が前カバー80の後端開口縁部87に凹設した防水用溝88内に挿着した防水用弾性体89に食込むことによって、外郭体Z内は水密状態となり、撮影が可能となる。

次いで、図外の焦点切換え用機構の焦点切換えスイッチを操作すると、防水カメラの鏡胴は第1図の通常撮影状態から第2図の望遠撮影状態へ、またはこの逆に切換えられ、望遠撮影に切換える際には、第2図に示すように、撮影レンズ100が装着せられてなる鏡胴が50が前進せしめられるとともに、補助レンズ101が撮影レンズ100の後方に進出せしめられ、撮影レンズ100の光軸と補助レンズ101の光軸とが一致せしめられる。このとき図外の焦点切換え用機構によって

鏡胴保持リング 40 と鏡胴 50 とを一体に前進せしめると、鏡胴保持リング 40 を構成する外側リング 42 と内側リング 43 との間に介装せしめたばね 33 は伸張し、このばね 33 の付勢によって、前遮光リング 30 は鏡胴保持リング 40、鏡胴 50 とともに前進するのを阻止されるも、鏡胴保持リング 40 の係止用錐 45 が前遮光リング 30 の後端面 32 に係合せしめられると、前遮光リング 30 は鏡胴保持リング 40、鏡胴 50 とともに前進せしめられ、第 2 図に示す望遠撮影状態となる。

以上のように、撮影レンズ 100 が装着せられてなる鏡胴 50 が前進せしめられた望遠撮影状態（第 2 図参照）のときの前遮光リング 30 は、通常の撮影状態（第 1 図、第 3 図参照）のときに比べて、鏡胴保持リング 40 に対して、通常撮影状態のときにおける前遮光リング 30 の後端面 32 と鏡胴保持リング 40 の係止用錐 45 との間の間隔  $l$  だけ後退した状態となるから、この間隔  $l$  の分だけ外郭体 Z の透光用窓ガラス 83 を装着した前端開口縁部 82 を後退せしめることが可能とな

る。

また、鏡胴50が前進せしめられる際には、焦点切換え用遮光部材60が鏡胴50とともに前進せしめられ、該遮光部材60を構成する後遮光リング63が遮光筒13から引出されることによって、遮光すべき範囲が拡大された状態における遮光が可能となる。

さらに、鏡胴50が進退せしめられる際には、鏡胴50に固定した焦点切換え用遮光部材60を構成する蛇の目の状の後遮光板61が鏡胴案内用筒状体12内に嵌合した状態で進退せしめられるので、鏡胴50の進退は円滑となる。

〔考案の効果〕

以上の説明によって明らかなように、本考案によくと、防水カメラの焦点距離切換え倍率を大きくするも、遮光すべき範囲が拡大された状態における遮光が可能であり、鏡胴の進退が円滑であり、外郭体の透光用窓ガラスを装着した前端開口縁部を後退せしめることが可能となり、その分だけ外郭体の突出度合を少なからしめることにより、防



水カメラの大型化を抑制できる防水カメラの提供が可能となった。

#### 4. 図面の簡単な説明

図面は本考案の実施例を示すものであって、第1図は通常撮影状態を示す縦断側面図、第2図は望遠撮影状態を示す縦断側面図、第3図は要部の一部切欠側面図、第4図は要部の一部の背面図である。

X：防水カメラ

Y：カメラ本体部

- |               |            |
|---------------|------------|
| 10：カメラボディ     | 11：拡径用段部   |
| 12：鏡胴案内用筒状体   | 13：遮光筒     |
| 20：前遮光板       | 30：前遮光リング  |
| 32：後端面        | 33：ばね      |
| 34：ばね受け爪      | 40：鏡胴保持リング |
| 41：円板         | 42：外側リング   |
| 43：内側リング      | 44：導光口     |
| 45：係止用鉤       | 46：切込み溝    |
| 50：鏡胴         |            |
| 60：焦点切換え用遮光部材 |            |

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61 : 後遮光板

63 : 後遮光リング

7 : 外郭体

80 : 前カバー

81 : 鏡胴案内用筒状体保護用筒体部

83 : 透光用窓ガラス

90 : 裏蓋

実用新案登録出願人 日東光学株式会社

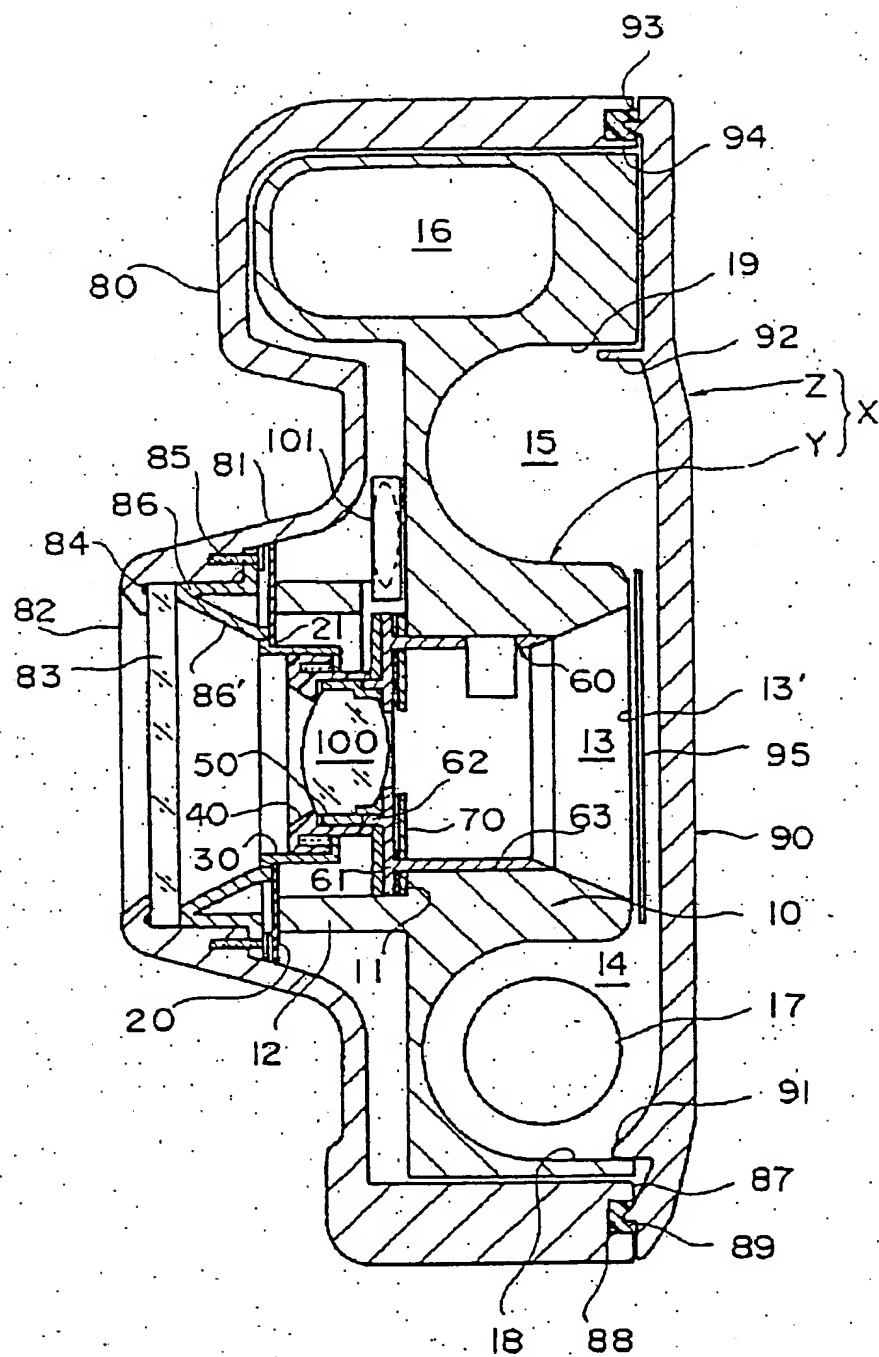
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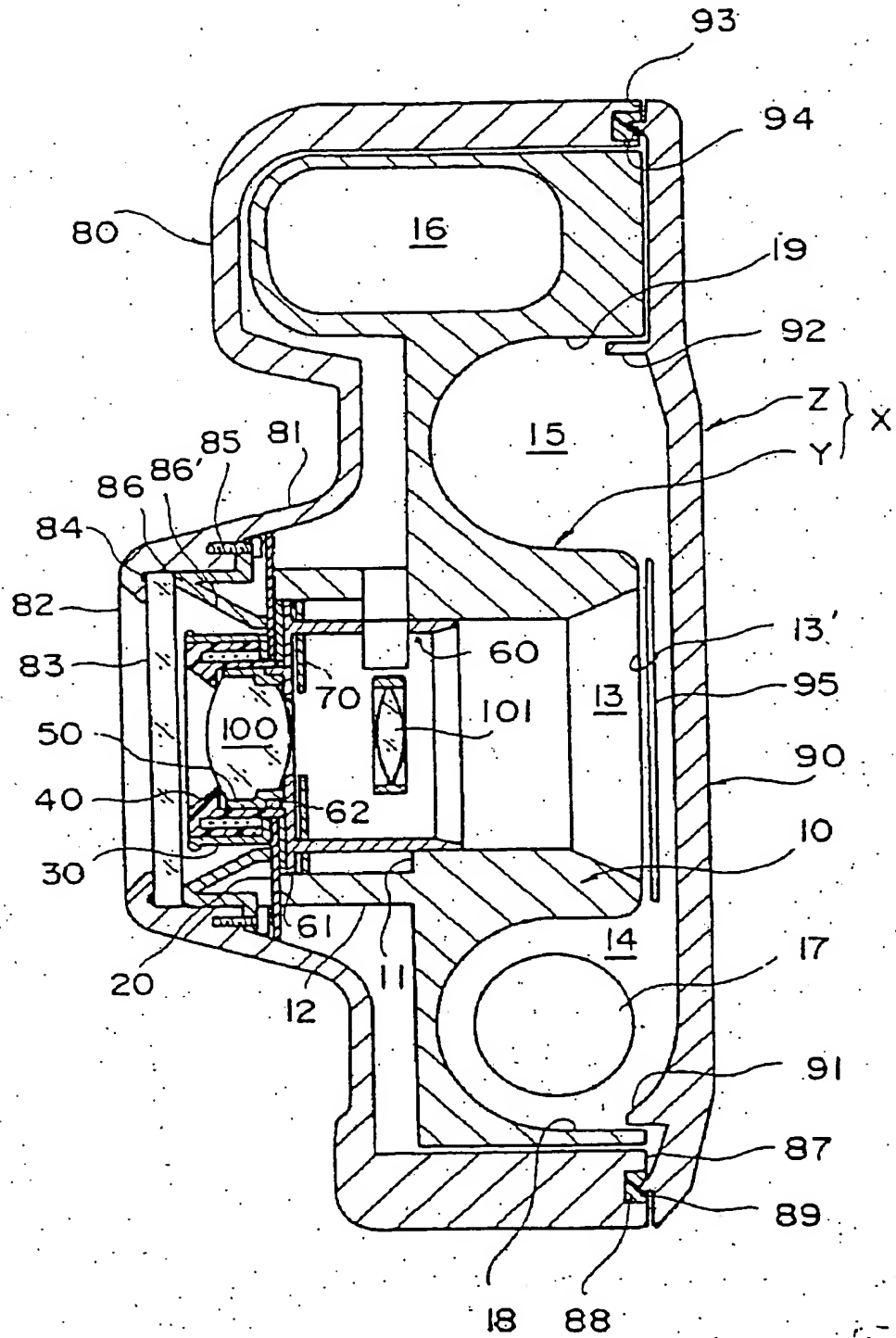
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第 1 図



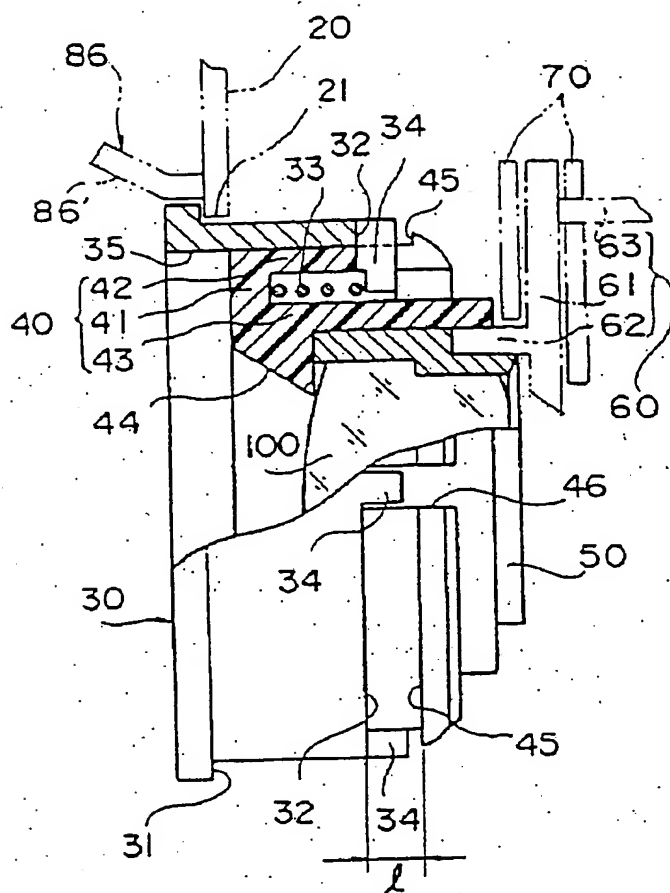
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第 2 図

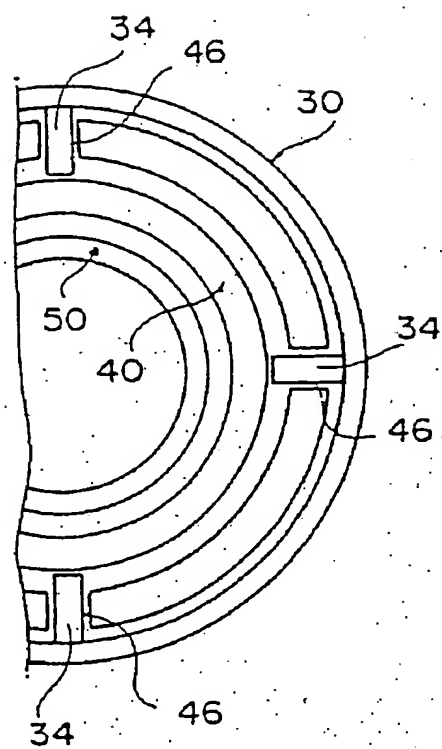


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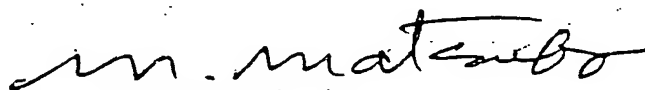


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*Date: September 18, 2003*

### *Declaration*

*I, Michihiko Matsuba, President of Fukuyama Sangyo Honyaku Center, Ltd., of 16-3, 2-chome; Nogami-cho, Fukuyama, Japan, do solemnly and sincerely declare that I understand well both the Japanese and English languages and that the attached document in English is a full and faithful translation, of the copy of Japanese Unexamined Utility Model No. Sho-64-34623 laid open on March 2, 1989.*

A handwritten signature in cursive script, appearing to read "m. matsuba".

*Michihiko Matsuba*

*Fukuyama Sangyo Honyaku Center, Ltd.*

WATERPROOF CAMERA

Japanese Unexamined Utility Model No. Sho-64-34623

Laid-open on: March 2, 1989

Application No. Sho-62-128088

Filed on: August 25, 1987

Inventor: Keitaro Kasahara

Inventor: Atsuro Yajima

Applicant: Nitto Kogaku Co., Ltd.

#### SPECIFICATION

1. TITLE OF THE UTILITY MODEL

WATERPROOF CAMERA

2. WHAT IS CLAIMED IS:

A waterproof camera, wherein a front lightproof ring having a plurality of spring bearing claws on a rear end surface is fitted movably forward or backward to a bull's-eye-like front lightproof plate fixed to a front end surface of a lens-barrel-guiding cylindrical body of a camera body in which the lens-barrel-guiding cylindrical body concentrically protrudes through a diameter-widening stepped portion to a front end of a lightproof barrel; whereas a lens-barrel-holding ring in which an outer ring having an engagement collar engaged with

a rear end surface of the front lightproof ring and a slit to which the spring bearing claw is loosely fitted and an inner ring holding a lens barrel are integrally formed with an interval therebetween on a rear side of a disk having a light guiding opening at a central part is fitted movably forward or backward into the front lightproof ring while interposing a spring caught by the spring bearing claw between the outer ring and the inner ring; and a camera main body to which a focus-switching lightproof member is fixed in which a bull's-eye-like rear lightproof plate fitted movably forward or backward into the lens-barrel-guiding cylindrical body and a rear lightproof ring fitted movably forward or backward into the lightproof barrel are integrally formed at a rear end of the lens barrel is contained in an outer hull body to which a rear lid is water-tightly screwed at a rear face part of a front cover in which a lens-barrel-guiding-cylindrical-body-protecting cylindrical portion on which a lightproof windowpane is water-tightly mounted is formed at a front face part.

### 3. DETAILED DESCRIPTION OF THE UTILITY MODEL

[Field of the Utility Model]

This invention relates to a waterproof camera.

[Description of Related Art]



Conventionally, there is a waterproof camera in which a camera main body is contained in an outer hull body in which a rear lid is water-tightly and closably screwed to a rear face part of a front cover having a lens-barrel-guiding-cylindrical-body-protecting cylindrical portion on which a light-penetrating windowpane is water-tightly mounted at a front face part.

[Object]

Furthermore, in this conventional waterproof camera, there is a need to enlarge a moving range of a photographic lens in order to raise a focal-length changing magnification, and a light-blocking range where light is blocked is expanded proportionally with the enlargement of the moving range of the photographic lens, and a protraction degree occurring when the photographic lens is drawn out increases proportionally therewith, and therefore it is inevitable that the front face part of the outer hull body with which the drawn photographic lens is covered will assume a more protruding shape. Disadvantageously, an increase in the protraction degree leads to an enlargement of the waterproof camera.

This invention has been made in consideration of these circumstances and aims to provide a waterproof camera capable of restricting the size enlargement although a focal-length

changing magnification is raised.

[Means for solving the object.]

In order to achieve the aim, this invention is a waterproof camera characterized in that a front lightproof ring having a plurality of spring bearing claws on a rear end surface is fitted movably forward or backward to a bull's-eye-like front lightproof plate fixed to a front end surface of a lens-barrel-guiding cylindrical body of a camera body in which the lens-barrel-guiding cylindrical body concentrically protrudes through a diameter-widening stepped portion to a front end of a lightproof barrel, whereas a lens-barrel-holding ring in which an outer ring having an engagement collar engaged with a rear end surface of the front lightproof ring and a slit to which the spring bearing claw is loosely fitted and an inner ring holding a lens barrel are integrally formed with an interval therebetween on a rear side of a disk having a light guiding opening at a central part is fitted movably forward or backward into the front lightproof ring while interposing a spring caught by the spring bearing claw between the outer ring and the inner ring, and a camera main body to which a focus-switching lightproof member is fixed in which a bull's-eye-like rear lightproof plate fitted movably forward or backward into the lens-barrel-guiding cylindrical body and

a rear lightproof ring fitted movably forward or backward into the lightproof cylindrical body are integrally formed at a rear end of the lens barrel is contained in an outer hull body to which a rear lid is water-tightly screwed at a rear face part of a front cover in which a lens-barrel-guiding-cylindrical-body-protecting cylindrical portion on which a lightproof windowpane is water-tightly mounted is formed at a front face part.

[Operation]

The waterproof camera according to this invention has the aforementioned structure, and, in switching from an ordinary photographic state in which the front lightproof ring, the lens-barrel-holding ring, and the lens barrel have been retracted to a telephotographic state, the lens-barrel-holding ring and the lens barrel are protracted together initially, and a spring interposed between an outer ring and an inner ring that constitute the lens-barrel-holding ring extends at this time, and, although the front lightproof ring is prevented from moving forward together with the lens-barrel-holding ring and the lens barrel because of the urging of this spring, the front lightproof ring is protracted together with the lens-barrel-holding ring and the lens barrel when an engagement collar of the lens-barrel-holding ring is

engaged with the rear end surface of the front lightproof ring, and a telephotographic state is reached.

As mentioned above, since the front lightproof ring being in the telephotographic state in which the lens barrel has been protracted reaches the state of being retracted by an interval between the rear end surface of the front lightproof ring and the engagement collar of the lens-barrel-holding ring in the ordinary photographic state with respect to the lens-barrel-holding ring in comparison with the ordinary photographic state in which the lens barrel has been retracted, a front-end opening edge on which a light-penetrating windowpane of an outer hull body has been mounted can be retracted to the extent of this interval.

Further, when the lens barrel is protracted, the blocking in a state in which a range to be blocked has been enlarged can be achieved by drawing the rear lightproof ring that constitutes the focus-switching lightproof member fixed to the lens barrel from the lightproof barrel.

Further, when the lens barrel is protracted or retracted, the lens barrel is smoothly guided by the lens-barrel-guiding cylindrical body because the rear lightproof plate that constitutes the focus-switching lightproof member fixed to the lens barrel is protracted or retracted in the state of being

fitted in the lens-barrel-guiding cylindrical body.

[Embodiment]

A detailed description will be hereinafter given of an embodiment of the waterproof camera according to this invention with reference to the drawings shown herein.

In FIG. 1, X is the waterproof camera, which is made up chiefly of a camera main body Y and an outer hull body Z watertightly including and holding the camera main body Y.

The camera main body Y is made up of a camera body 10, a front lightproof plate 20, a front lightproof ring 30, a lens-barrel-holding ring 40, a lens barrel 50 on which a photographic lens 100 is mounted, a focus-switching lightproof member 60, a shutter member 70, an auxiliary lens 101, and other elements, which are not shown and are not described, i.e., a focus-switching mechanism, a shutter operation activating mechanism, an auxiliary-lens advancing/retracting operating mechanism, and a driving motor. The outer hull body Z is made up of a front cover 80 and a back lid 90.

Furthermore, the camera body 10 is almost the same as the conventional one and has a lens-barrel-guiding cylindrical body 12 enclosing an optical-path-forming portion through a diameter-widening stepped portion 11 on the front surface side, a lightproof barrel 13 concentric with and smaller in diameter

than the lens-barrel-guiding cylindrical body 12 on the rear surface side, a spool chamber 14 opened backward on one side of the lightproof barrel 13, a cartridge chamber 15 opened backward on the other side of the lightproof barrel 13, and a battery chamber 16 outside the cartridge chamber 15. A spool 17 is mounted in the spool chamber 14 so as to be rotated by a driving mechanism not shown.

The front lightproof plate 20 is formed by applying antireflection processing onto a bull's-eye-like disk having a through-hole 21 at the central part. This front lightproof plate 20 is fixed to be concentric with the front end surface of the lens-barrel-guiding cylindrical body 12 of the camera body 10. As shown especially in FIG. 3 and FIG. 4, the front lightproof ring 30 is formed by a collar 31 engaged with the front surface of the front lightproof plate 20 at the front end part consisting mainly of a ring fitted movably forward or backward to or from the through-hole 21 of the front lightproof plate 20 and by several spring bearing claws 34; . . . to engage the rear end of a spring 33 interposed between an outer ring 42 and an inner ring 43 that constitute the lens-barrel-holding ring 40 described later which are caused to protrude inward at substantially equal intervals at the rear end surface 32.

In the lens-barrel-holding ring 40, an outer ring 42 having an outer diameter equal to that of a disk 41 is integrally formed with an elastic material at an outer edge of the rear side of the disk 41 that is fitted to the front end opening 35 of the front lightproof ring 30 and that has a funnel-like light guiding opening 44 at the central part, and an inner ring 43 that is fitted to the inner end face of the spring bearing claws 34, . . . of the front lightproof ring 30 is integrally formed with an elastic material in the vicinity of the light guiding opening 44 of the rear side of the disk 41. An engagement collar 45 is formed to protrude outward at the rear end edge of the outer ring 42, and slits 46, . . . to which the spring bearing claws 34, . . . of the front lightproof ring 30 are loosely fitted are formed at the rear end of the outer ring 42, and the lens barrel 50 is held in the inner ring 43.

The focus-switching lightproof member 60 is formed by integrally forming an annular projection 62 fixed to the rear end surface of the lens barrel 50 on the front side of a bull's-eye-like rear lightproof plate 61 fitted movably forward or backward in the lens-barrel-guiding cylindrical body 12 of the camera body 10 and a rear lightproof ring 63 fitted movably forward or backward in the lightproof barrel 13 of the camera body 10 on the rear side thereof, and the

shutter member 70 is disposed on the rear lightproof plate 61.

The focus-switching lightproof member 60, the lens-barrel-holding ring 40, and the lens barrel 50 on which the photographic lens 100 is mounted are protracted or retracted together, and a range to be protracted or retracted is restricted by the rear lightproof plate 61, the front lightproof plate 20, and the diameter-widening stepped portion 11.

101 is an auxiliary lens that cooperates with the photographic lens 100 in telephotography. This auxiliary lens 101 is retracted out of the optical path of the photographic lens 100 in usual photography and is protracted backward from the photographic lens 100 in telephotography by an auxiliary-lens advancing/retracting operating mechanism, not shown, that responds to a focus-switching mechanism not shown, so that the optical axis of the photographic lens 100 coincides with the optical axis of the auxiliary lens 101.

Further, at the front cover 80, a truncated-cone-like lens-barrel-guiding-cylindrical-body-protecting cylindrical portion 81 having a central axis line that coincides with the central axis line shared between the lightproof barrel 13 and the lens-barrel-guiding cylindrical body 12 is formed at the front face part with which the front



surface of the camera main body Y is covered, and a light-penetrating windowpane 83 is water-tightly mounted on the front-end opening edge 82 by an O ring 84 and by an annular pressing member 86 having a funnel-like light guiding opening 86' fixed to the interior part of the front-end opening edge 82 with a bis-screw 85, whereas an elastic body 89 for waterproofing is inserted into a groove 88 for waterproofing that is formed by hollowing a rear-end opening edge 87 of the part covering the side face of the camera main body Y.

Further, at the back lid 90, a projection 91 that is engaged with the inner surface 18 of the outer wall part of the spool chamber 14 of the camera body 10 and a projection 92 that is engaged with the inner surface 19 of the outer wall part of the cartridge chamber 15 are formed on the inner surface of the lid plate, and a protruding bar 94 for waterproofing that cooperates with the elastic body 89 for waterproofing of the front cover 80 is erected on a rim portion 93 formed to fit the rear-end opening edge 87 of the front cover 80, and a pressure plate 95 by which a film is pressed against the rear-end opening edge 13' of the lightproof barrel 13 is attached between the projections 91 and 92. The outer hull body Z is formed by openably and closably attaching the back lid 90 to the front cover 80 by means of a hinge not shown,

and the interior of the outer hull body Z is kept watertight when the back lid 90 is closed.

In order to contain the camera main body Y in the outer hull body Z, the peripheral edge part of the front lightproof plate 20 is fixed to the inner surface of the lens-barrel-guiding-cylindrical-body-protecting cylindrical portion 81, and the funnel-like light guiding opening 86' of the annular pressing member 86 is fixed to the front surface of the front lightproof plate 20, and the camera main body Y is fixed to the front cover 80 by fitting the side face of the camera body 10 to the front cover 80, and then the back lid 90 is closed to become watertight.

Since the waterproof camera according to this invention is structured as mentioned above, the protruding bar 94 for waterproofing that has been erected on the rim portion 93 of the back lid 90 bites into the elastic body 89 for waterproofing that has been inserted in the groove 88 for waterproofing that has been formed by hollowing the rear end opening edge 87 of the front cover 80 when the back lid 90 is opened, a film is then loaded, and the back lid 90 is closed. Thereby, the interior of the outer hull body Z becomes watertight, and a photographable state is reached.

Thereafter, when a focus-changing switch of the focus-

switching mechanism not shown is operated, the lens barrel of the waterproof camera is switched from the ordinary photographic state of FIG. 1 to the telephotographic state of FIG. 2 or vice versa, and, when it is switched to telephotography, the lens barrel 50 on which the photographic lens 100 has been mounted is protracted as shown in FIG. 2, and the auxiliary lens 101 is protracted backward from the photographic lens 100, the optical axis of the photographic lens 100 is caused to coincide with the optical axis of the auxiliary lens 101. If the lens-barrel-holding ring 40 and the lens barrel 50 are protracted together by the focus-switching mechanism not shown at this time, the spring 33 interposed between the outer ring 42 and the inner ring 43 that constitute the lens-barrel-holding ring 40 extends, and the front lightproof ring 30 is prevented from moving forward together with the lens-barrel-holding ring 40 and the lens barrel 50 because of the urging of the spring 33. However, when the engagement collar 45 of the lens-barrel-holding ring 40 is engaged with the rear end surface 32 of the front lightproof ring 30, the front lightproof ring 30 is protracted together with the lens-barrel-holding ring 40 and the lens barrel 50, and a telephotographic state shown in FIG. 2 is reached.

As mentioned above, the front lightproof ring 30 placed in the telephotographic state (see FIG. 2) in which the lens barrel 50 on which the photographic lens 100 has been mounted is protracted is retracted by an interval  $\epsilon$  between the engagement collar 45 of the lens-barrel-holding ring 40 and the rear end surface 32 of the front lightproof ring 30 in the ordinary photographic state with respect to the lens-barrel-holding ring 40 in comparison with the ordinary photographic state (see FIG. 1 and FIG. 3), the front-end opening edge 82 on which the light-penetrating windowpane 83 of the outer hull body Z has been mounted can be retracted to the extent of this interval  $\epsilon$ .

Additionally, when the lens barrel 50 is protracted, the focus-switching lightproof member 60 is protracted together with the lens barrel 50, and the rear lightproof ring 63 that is a constituent element of the lightproof member 60 is drawn from the lightproof barrel 13, and hence blocking in a state where a range to be blocked is enlarged can be achieved.

Additionally, when the lens barrel 50 is protracted or retracted, the bull's-eye-like rear lightproof plate 61 that is a constituent element of the focus-switching lightproof member 60 fixed to the lens barrel 50 is protracted or retracted in the state of being fitted in the lens-barrel-guiding

cylindrical body 12, and hence the lens barrel 50 can be smoothly protracted or retracted.

[Effect of the invention]

As is apparent from the foregoing description, according to this invention, even if the focal-length changing magnification of the waterproof camera is enlarged, blocking in a state where a range to be blocked has been enlarged can be achieved, and the lens barrel can be smoothly protracted or retracted, and the front-end opening edge to which the light-penetrating windowpane of the outer hull body has been attached can be retracted, and it becomes possible to provide a waterproof camera capable of restricting size enlargement of the waterproof camera by reducing a protraction degree of the outer hull body to the extent of the retraction.

#### 4. BRIEF DESCRIPTION OF THE DRAWINGS

The drawings show the embodiment of this invention, in which FIG. 1 is a longitudinal sectional side view showing an ordinary photographic state, FIG. 2 is a longitudinal sectional side view showing a telephotographic state, FIG. 3 is a partially cutaway side view of a main part, and FIG. 4 is a rear view of a part of the main part.

X: Waterproof camera

Y: Camera main body  
10: Camera body  
12: Lens-barrel-guiding cylindrical body  
20: Front lightproof plate  
32: Rear end surface  
34: Spring bearing claw  
41: Disk  
43: Inner ring  
45: Engagement collar  
11: Diameter-widening stepped portion  
13: Lightproof barrel  
30: Front lightproof ring  
33: Spring  
40: Lens-barrel-holding ring  
42: Outer ring  
44: Light guiding opening  
46: Slit  
50: Lens barrel  
60: Focus-switching lightproof member  
61: Rear lightproof plate  
Z: Outer hull body  
63: Rear lightproof ring  
80: Front cover

81: Lens-barrel-guiding-cylindrical-body-protecting  
cylindrical portion -

83: Light-penetrating windowpane

90: Back lid

Applicant for registration of utility model  
Nitto Kougaku Co., Ltd.

Representative Oshima Michio

Representative Okino Saichi

# Fig.1

